FIG. 1
(PRIOR ART)

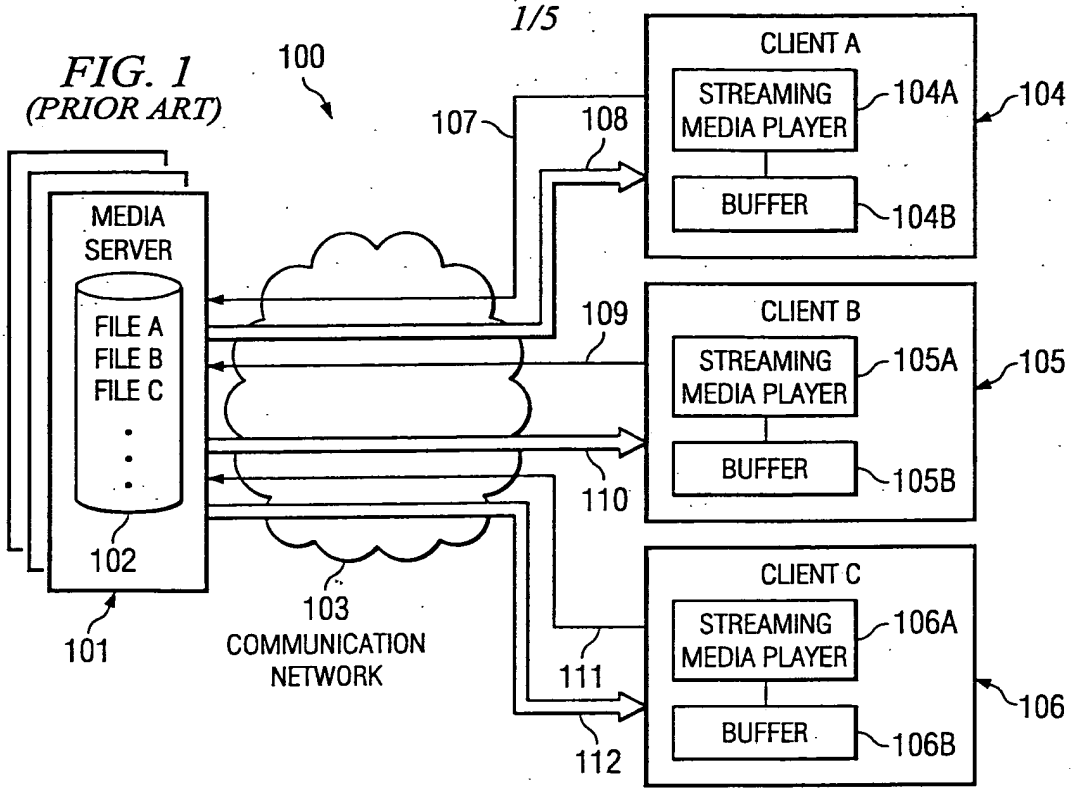


FIG. 2

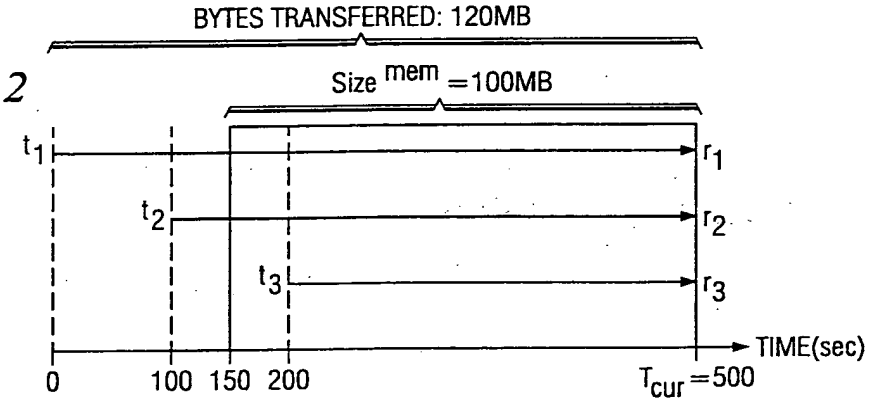


FIG. 3

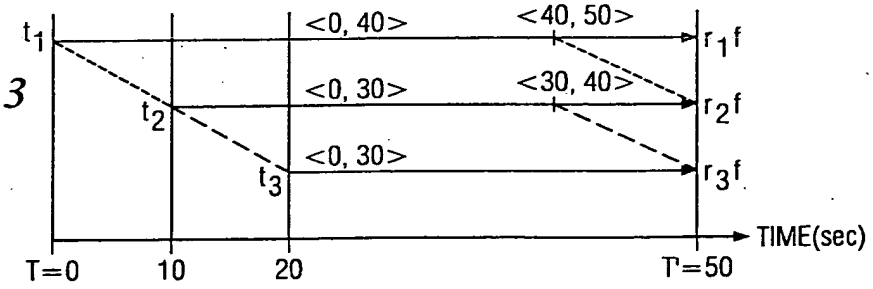


FIG. 4

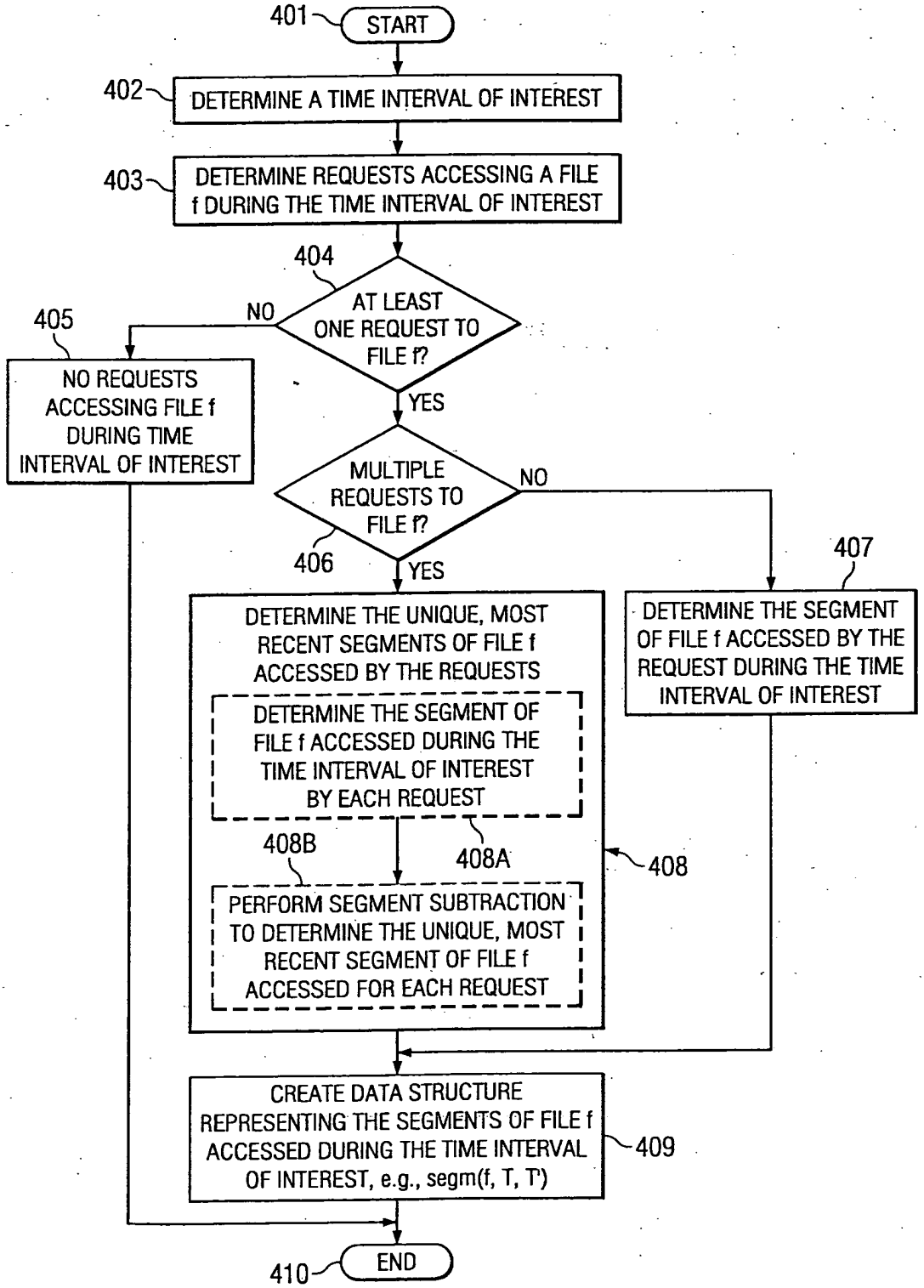

401
START
402
DETERMINE A TIME INTERVAL OF INTEREST
403
DETERMINE REQUESTS ACCESSING A FILE f DURING THE TIME INTERVAL OF INTEREST
404
AT LEAST ONE REQUEST TO FILE f?
NO
405
NO REQUESTS ACCESSING FILE f DURING TIME INTERVAL OF INTEREST
YES
MULTIPLE REQUESTS TO FILE f?
NO
406
YES
407
DETERMINE THE SEGMENT OF FILE f ACCESSED BY THE REQUEST DURING THE TIME INTERVAL OF INTEREST
DETERMINE THE UNIQUE, MOST RECENT SEGMENTS OF FILE f ACCESSED BY THE REQUESTS
DETERMINE THE SEGMENT OF FILE f ACCESSED DURING THE TIME INTERVAL OF INTEREST BY EACH REQUEST
408A
408B
PERFORM SEGMENT SUBTRACTION TO DETERMINE THE UNIQUE, MOST RECENT SEGMENT OF FILE f ACCESSED FOR EACH REQUEST
408
CREATE DATA STRUCTURE REPRESENTING THE SEGMENTS OF FILE f ACCESSED DURING THE TIME INTERVAL OF INTEREST, e.g., segm(f, T, T')
409
410
END

FIG. 5

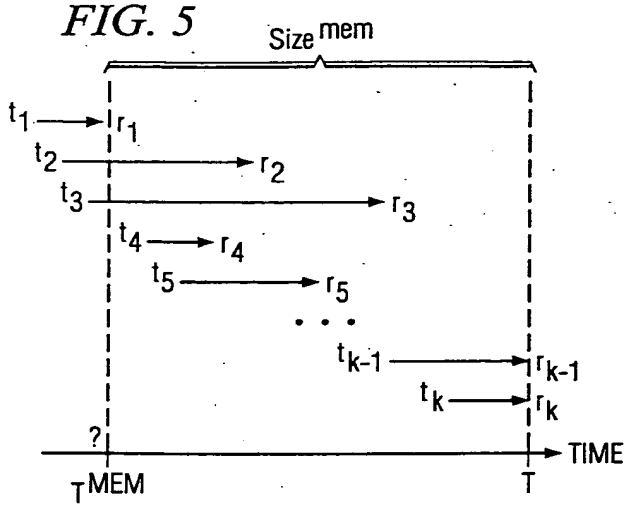


FIG. 6

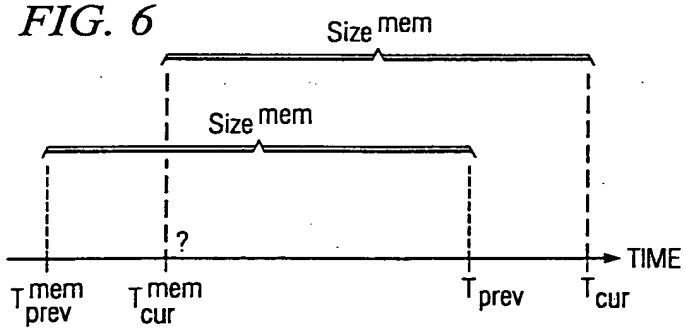


FIG. 7

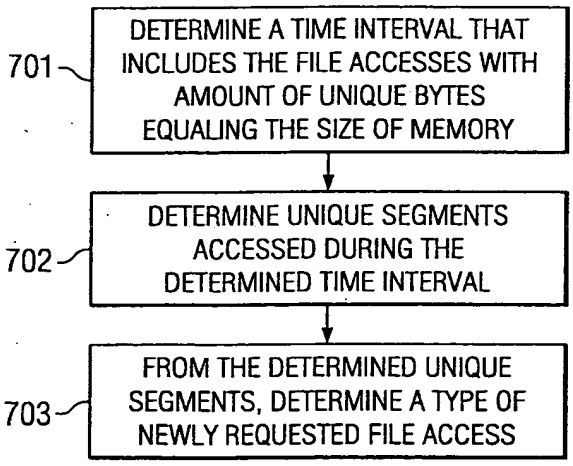


FIG. 8 4/5

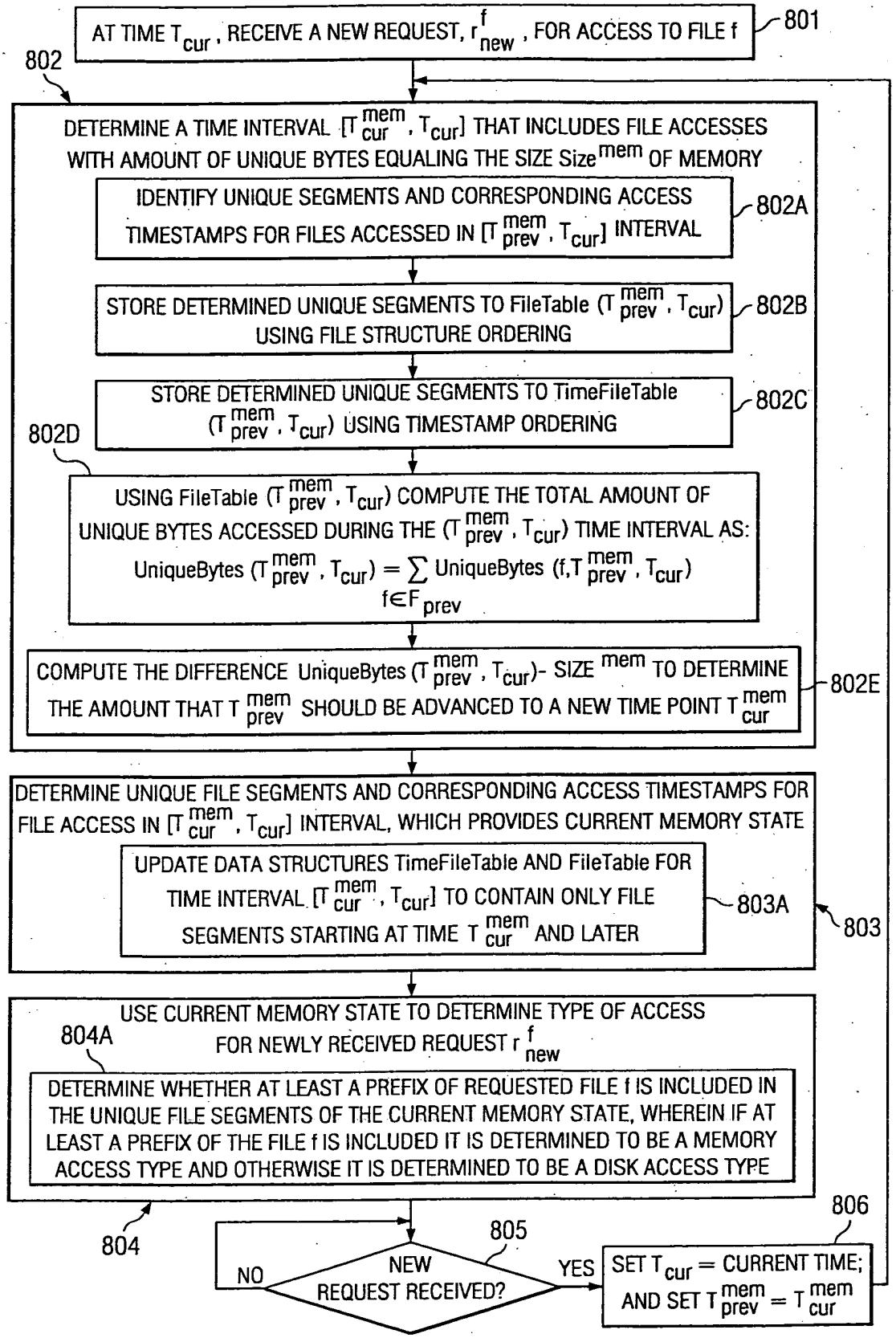

AT TIME T_{cur}, RECEIVE A NEW REQUEST, r^{f}_{new}, FOR ACCESS TO FILE f
801
802
DETERMINE A TIME INTERVAL $[T^{mem}_{cur}, T_{cur}]$ THAT INCLUDES FILE ACCESSES WITH AMOUNT OF UNIQUE BYTES EQUALING THE SIZE $Size^{mem}$ OF MEMORY
IDENTIFY UNIQUE SEGMENTS AND CORRESPONDING ACCESS TIMESTAMPS FOR FILES ACCESSED IN $[T^{mem}_{prev}, T_{cur}]$ INTERVAL
802A
STORE DETERMINED UNIQUE SEGMENTS TO FileTable $(T^{mem}_{prev}, T_{cur})$ USING FILE STRUCTURE ORDERING
802B
STORE DETERMINED UNIQUE SEGMENTS TO TimeFileTable $(T^{mem}_{prev}, T_{cur})$ USING TIMESTAMP ORDERING
802C
802D
USING FileTable $(T^{mem}_{prev}, T_{cur})$ COMPUTE THE TOTAL AMOUNT OF UNIQUE BYTES ACCESSED DURING THE $(T^{mem}_{prev}, T_{cur})$ TIME INTERVAL AS: $UniqueBytes(T^{mem}_{prev}, T_{cur}) = \sum_{f \in F_{prev}} UniqueBytes(f, T^{mem}_{prev}, T_{cur})$
COMPUTE THE DIFFERENCE $UniqueBytes(T^{mem}_{prev}, T_{cur}) - SIZE^{mem}$ TO DETERMINE THE AMOUNT THAT T^{mem}_{prev} SHOULD BE ADVANCED TO A NEW TIME POINT T^{mem}_{cur}
802E
DETERMINE UNIQUE FILE SEGMENTS AND CORRESPONDING ACCESS TIMESTAMPS FOR FILE ACCESS IN $[T^{mem}_{cur}, T_{cur}]$ INTERVAL, WHICH PROVIDES CURRENT MEMORY STATE
UPDATE DATA STRUCTURES TimeFileTable AND FileTable FOR TIME INTERVAL $[T^{mem}_{cur}, T_{cur}]$ TO CONTAIN ONLY FILE SEGMENTS STARTING AT TIME T^{mem}_{cur} AND LATER
803A
803
USE CURRENT MEMORY STATE TO DETERMINE TYPE OF ACCESS FOR NEWLY RECEIVED REQUEST r^{f}_{new}
804A
DETERMINE WHETHER AT LEAST A PREFIX OF REQUESTED FILE f IS INCLUDED IN THE UNIQUE FILE SEGMENTS OF THE CURRENT MEMORY STATE, WHEREIN IF AT LEAST A PREFIX OF THE FILE f IS INCLUDED IT IS DETERMINED TO BE A MEMORY ACCESS TYPE AND OTHERWISE IT IS DETERMINED TO BE A DISK ACCESS TYPE
804
805
NEW REQUEST RECEIVED?
NO
YES
806
SET T_{cur} = CURRENT TIME; AND SET $T^{mem}_{prev} = T^{mem}_{cur}$

FIG. 9

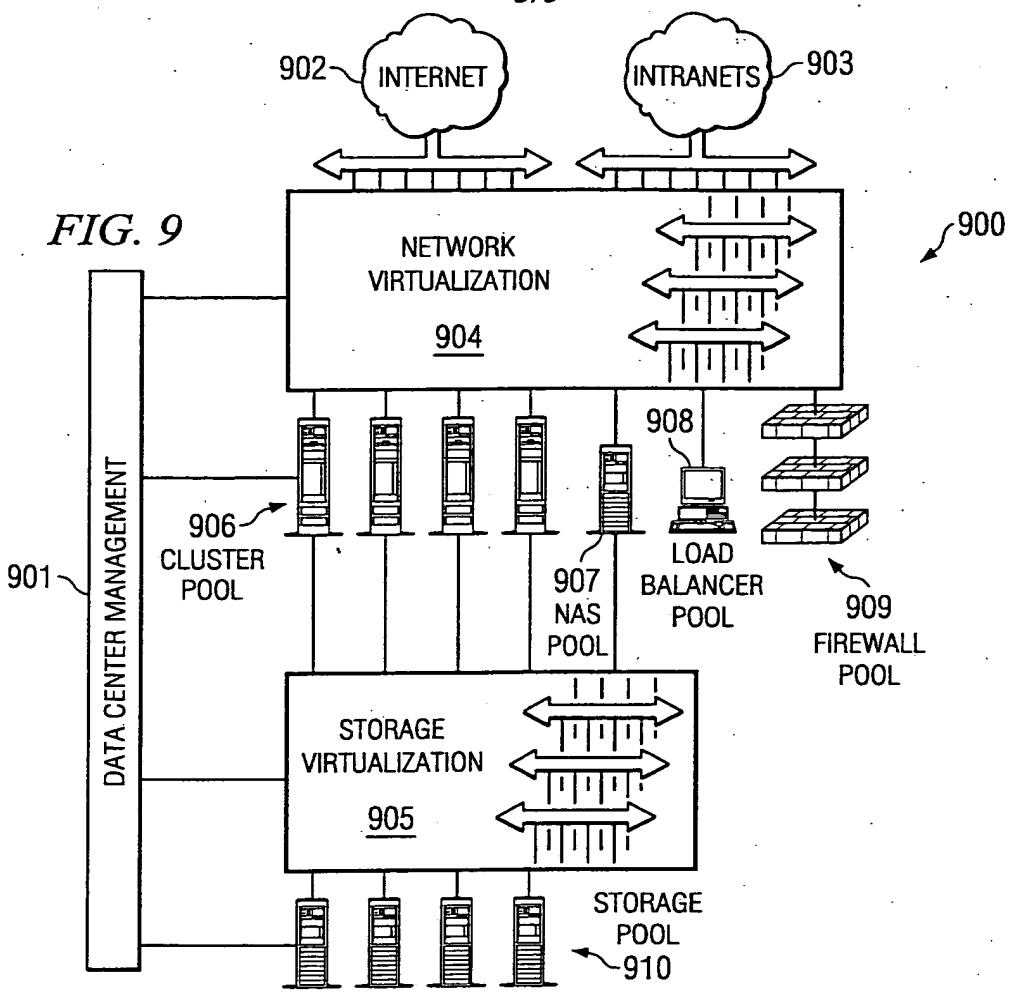
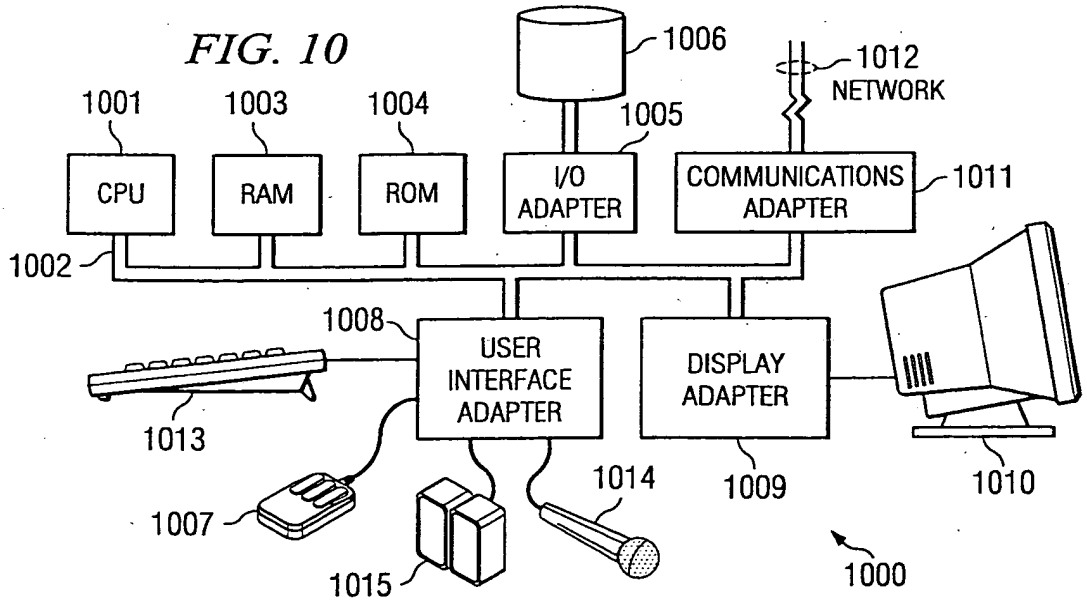

902
INTERNET
INTRANETS
903
900
NETWORK
VIRTUALIZATION
904
908
906
CLUSTER
POOL
901
DATA CENTER MANAGEMENT
907
NAS
POOL
LOAD
BALANCER
POOL
909
FIREWALL
POOL
STORAGE
VIRTUALIZATION
905
STORAGE
POOL
910

FIG. 10


1006
1012
NETWORK
1001
1003
1004
1005
CPU
RAM
ROM
I/O
ADAPTER
COMMUNICATIONS
ADAPTER
1011
1002
1008
USER
INTERFACE
ADAPTER
DISPLAY
ADAPTER
1013
1014
1007
1009
1010
1015
1000